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where:

$Z_1$  and  $Z_2$ , independently of one another, are both amino acids selected from the group consisting of ornithine, lysine, arginine and histidine;

$n$  is an integer ranging from 1 to about 2,000;

$A_1$  and  $A_2$ , independently of one another, are selected from the group consisting of the groups  $X_1 - X_4$  as follows:

$X_1$  is a straight-chain alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring  $-CH_2-$  groups can be replaced with an O or S atom;

$X_2$  is a branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring  $-CH_2-$  groups can be replaced with an O or S atom;

$X_3$  is a straight-chain or branched alkyl group substituted with one or two OH, SH,  $NH_2$  or amine groups within about 3 carbon atoms of the bond between  $X_3$  and Z;

$X_4$  is a substituted straight-chain or branched alkyl, alkenyl or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring  $-CH_2-$  groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

68. The lipophilic polyamino acid of claim 67 wherein  $n$  is between 10 and 50.

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69. The lipophilic polyamino acid of claim 67 wherein  $Z_1$  and  $Z_2$  are lysines.

70. The lipophilic polyamino acid of claim 67 wherein  $Z_1$  and  $Z_2$  are arginines.

71. The lipophilic polyamino acid of claim 67 wherein  $A_1$  and  $A_2$ , independently of one another, are a straight-chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring  $-CH_2-$  groups can be replaced with an O or S atom.

72. The lipophilic polyamino acid of claim 71 wherein alkyl, alkenyl, or alkynyl groups have from about 12 to about 22 carbon atoms.

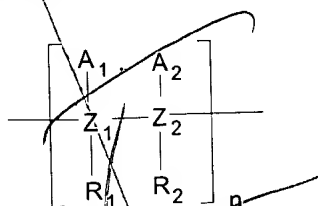
Sub Db 73. The lipophilic polyamino acid of claim 67 wherein the  $A_1$  and  $A_2$  groups are alkyl groups having from about 12 to 22 carbon atoms.

74. The lipophilic polyamino acid of claim 67 wherein  $A_1$  and  $A_2$ , independently of one another, are straight-chain or branched alkyl groups substituted with one or two OH, SH,  $NH_2$ , or amine groups within about 3 carbon atoms of the bond between  $X_3$  and Z.

75. The lipophilic polyamino acid of claim 67 wherein  $A_1$  and  $A_2$ , independently of one another, are substituted straight-chain or branched alkyl, alkenyl or alkynyl groups having from 2 to about 22 carbon atoms wherein the substituent is an aromatic alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring  $-CH_2-$  groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

C 76. A composition for transfecting cells which comprises a nucleic acid and a lipophilic polyamino acid of claim 67.

77. The composition of claim 76 wherein the  $A_1$  and  $A_2$  groups of said lipophilic polyamino acid are alkyl groups having from about 12 to about 22 carbon atoms.
78. A lipid aggregate comprising a lipophilic polyamino acid of claim 67.
79. A method for transfecting a cell which comprises the step of contacting the composition of claim 76 with a cell.
80. A transfection kit which comprises one or more lipophilic polyamino acids of claim 67.
81. A lipophilic polycationic polysaccharide of formula:



and salts thereof,

where:

$Z_1$  and  $Z_2$ , independently of one another, are monosaccharides;

$n$  is an integer ranging in value from 1 to about 600;

$R_1$  and  $R_2$ , independently of one another, are tertiary amines; and

$A_1$  and  $A_2$ , independently of one another, are selected from the group consisting of groups  $X_1 - X_4$  as follows:

$X_1$  is a straight-chain alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring  $-CH_2-$  groups can be replaced with an O or S atom;

$X_2$  is a branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring  $-CH_2-$  groups can be replaced with an O or S atom;

$X_3$  is a straight-chain or branched alkyl group substituted with one or two OH, SH,  $NH_2$  or amine groups within about 3 carbon atoms of the bond between  $X_3$  and Z;

$X_4$  is a substituted straight-chain or branched alkyl, alkenyl or alkynyl group having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring  $-CH_2-$  groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.

82. The polycationic polysaccharide of claim 81 wherein  $Z_1$  and  $Z_2$  are both glucose.

83. The polycationic polysaccharide of claim 81 wherein n is between 50 and 100.

84. The polycationic polysaccharide of claim 81 wherein  $R_1$  and  $R_2$  are diethylaminoethyl groups.

85. The polycationic polysaccharide of claim 81 wherein  $A_1$  and  $A_2$ , independently of one another, are a straight-chain or branched alkyl, alkenyl, or alkynyl group having from 2 to about 22 carbon atoms wherein one or more non-neighboring  $-CH_2-$  groups can be replaced with an O or S atom.

86. The polycationic polysaccharide of claim 81 wherein alkyl, alkenyl, or alkynyl groups have from about 12 to about 22 carbon atoms.
87. The polycationic polysaccharide of claim 81 wherein  $A_1$  and  $A_2$ , independently of one another, are straight-chain or branched alkyl groups substituted with one or two OH, SH,  $NH_2$  or amine groups within about 3 carbon atoms of the bond between  $X_3$  and Z.
88. The polycationic polysaccharide of claim 81 wherein  $A_1$  and  $A_2$ , independently of one another, are substituted straight-chain or branched alkyl, alkenyl or alkynyl groups having from 2 to about 22 carbon atoms wherein the substituent is an aromatic, alicyclic, heterocyclic or polycyclic ring and wherein one or more of the non-neighboring  $-CH_2-$  groups of said alkyl, alkenyl or alkynyl group can be substituted with an O or S atom.
89. A composition for transfecting cells which comprises a nucleic acid and a polycationic polysaccharide of claim 81.
90. The composition of claim 89 wherein the  $A_1$  and  $A_2$  groups of said polycationic polysaccharide are alkyl groups having from about 12 to about 22 carbon atoms.
91. A lipid aggregate comprising a polycationic polysaccharide of claim 81.
92. A method for transfecting a cell which comprises the step of contacting the composition of claim 89 with a cell.
93. A transfection kit which comprises one or more polycationic polysaccharides of claim 81.--